

accompanying guidance for UV are consistent with the Agreement.

UV Dose Tables

The UV dose values in Table IV-21 are based on meta-analyses of UV inactivation studies with *Cryptosporidium parvum*, *Giardia lamblia*, *Giardia muris*, and adenovirus (Qian *et al.* 2003, USEPA 2003d). Proposed UV doses for inactivation of viruses are based on the dose-response of adenovirus because, among viruses that have been studied, it appears to be the most UV resistant and is a widespread waterborne pathogen (health effects of adenovirus are described in Embrey 1999).

The data supporting the dose values in Table IV-21 are from bench-scale studies using low pressure mercury vapor lamps. These data were chosen because the experimental conditions allow UV dose to be accurately quantified. Low pressure lamps emit light primarily at a single wavelength (254 nm) within the germicidal range of 200–300 nm. However, as noted earlier, these dose tables can be applied to reactors with other lamp types through reactor challenge testing, as described in the draft guidance manual. Bench scale studies are preferable for determining pathogen dose-response characteristics, due to the uniform dose distribution.

The data sets and statistical evaluation that were used to develop the UV dose table for *Cryptosporidium*, *Giardia lamblia*, and viruses are described in the draft UV Disinfection Guidance Manual (USEPA 2003d) and Qian *et al.* 2003.

Reactor Validation Testing

Today's proposal requires testing of full-scale UV reactors because of the difficulty in predicting reactor disinfection performance based on modeled results or on the results of testing at a reduced scale. All flow-through UV reactors deliver a distribution of doses due to variation in light intensity within the reactor and the different flow paths of particles passing through the reactor. Moreover, the reactor dose distribution varies temporally due to processes like lamp aging and fouling, changes in UV absorbance of the water, and fluctuations in flow rate. Consequently, it is more reliable to evaluate reactor performance through a full scale test under conditions that can be characterized as "worst case" for a given application. Such conditions include maximum and minimum flow rate and reduced light intensity within the reactor that accounts for lamp aging, fouling, and UV absorbance of the

water. Protocols for reactor validation testing are presented in the draft UV guidance manual.

c. *Request for comment.* The Agency requests comment on whether the criteria described in this section for awarding treatment credit for UV disinfection are appropriate, and whether additional criteria, or more specific criteria, should be included.

16. Individual Filter Performance

a. *What is EPA proposing today?* EPA is proposing an additional 1.0 log *Cryptosporidium* treatment credit for systems that achieve individual filter performance consistent with the goals established for the Partnership for Safe Water Phase IV in August 2001 (AWWA *et al.* 2001). Specifically, systems must demonstrate ongoing compliance with the following turbidity criteria, based on continuous monitoring of turbidity for each individual filter as required under 40 CFR 141.174 or 141.560, as applicable:

- (1) Filtered water turbidity less than 0.1 NTU in at least 95% of the maximum daily values recorded at each filter in each month, excluding the 15 minute period following backwashes, and
- (2) No individual filter with a measured turbidity level of greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

Note that today's proposal does not include a required peer review step as a condition for receiving additional credit. Rather, EPA is proposing to award additional credit to systems that meet the performance goals of a peer review program (Phase IV). Systems that receive the 1 log additional treatment credit for individual filter performance, as described in this section, cannot also receive an additional 0.5 log additional credit for lower finished water turbidity as described in section IV.C.8.

b. *How was this proposal developed?* In the Stage 2 M-DBP Agreement in Principle, the Advisory Committee recommended a peer review program as a microbial toolbox component that should receive a 1.0 log *Cryptosporidium* treatment credit. The Committee specified Phase IV of the Partnership for Safe Water (Partnership) as an example of the type of peer review program where a 1.0 log credit would be appropriate.

The Partnership is a voluntary cooperative program involving EPA, the Association of Metropolitan Water Agencies (AMWA), the American Water Works Association (AWWA), the National Association of Water Companies (NAWC), the Association of State Drinking Water Administrators (ASDWA), the American Water Works

Association Research Foundation (AWWARF), and surface water utilities throughout the United States. The intent of the Partnership is to increase protection against microbial contaminants by optimizing treatment plant performance.

At the time of the Advisory Committee recommendation, Phase IV was under development by the Partnership. It was to be based on Composite Correction Program (CCP) (USEPA 1991) procedures and performance goals, and was to be awarded based on an on-site evaluation by a third-party team. The performance goals for Phase IV were such that, over a year, each sedimentation basin and each filter would need to produce specified turbidity levels based on the maximum of all the values recorded during the day. Sedimentation performance goals were set at 2.0 NTU if the raw water was greater than 10 NTU on an annual basis and 1.0 NTU if the raw water was less than 10 NTU. Each filter was to meet 0.1 NTU 95% of the time except for the 15 minute period following placing the filter in operation. In addition, filters were expected to have maximum turbidity of 0.3 NTU and return to less than 0.1 NTU within 15 minutes of the filter being placed in service.

The primary purpose of the on-site evaluation was to confirm that the performance of the plant was consistent with Phase IV performance goals and that the system had the administrative support and operational capabilities to sustain the performance long-term. The on-site evaluation in Phase IV also allowed utilities that could not meet the desired performance goals to demonstrate to the third-party that they had achieved the highest level of performance given their unique raw water quality.

After the signing of the Stage 2 M-DBP Agreement in Principle in September 2000, the Partnership decided to eliminate the on-site third-party evaluation as a component of Phase IV. Instead, the requirement for Phase IV is for the water system to complete an application package that will be reviewed by trained utility volunteers. Included in the application package is an Optimization Assessment Spreadsheet in which the system enters water quality and treatment data to demonstrate that Phase IV performance levels have been achieved. The application also requires narratives related to administrative support and operational capabilities to sustain performance long-term.

Today's proposal is consistent with the performance goals of Phase IV.